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ASSISTANT COMMISSIONER FOR PATENTS

PATENT APPLICATION

Washington, D.C. 20231

Transmitted herewith for filing under 37 CFR 1.53(b) is the

- ☒ [X] patent application of
☐ [] continuation patent application of
☐ [] divisional patent application of
☐ [] continuation-in-part patent application of

Inventors: PETER GERBER, FABIAN OCHSNER

For: INTERROGATION AND RESPONDER SYSTEM

- ☒ [X] This application claims priority from each of the following Application Nos./filing dates:

Swiss appl. No. 2000 0943/00, filed May 12, 2000

the disclosure(s) of which is (are) incorporated by reference.

- ☐ [] Please amend this application by adding the following before the first sentence: "This application is a ☐ [] continuation ☐ [] continuation-in-part of and claims the benefit of U.S. Provisional Application No. 60/_____, filed _____, the disclosure of which is incorporated by reference."

Enclosed are:

- ☒ [X] 4 page(s) of specification
☒ [X] 2 page(s) of claims
☒ [X] 1 page of Abstract
☒ [X] 1 sheet(s) of ☐ [] formal ☒ [X] informal drawing(s).

An assignment of the invention to _____

- ☒ [X] A ☐ [] signed ☒ [X] unsigned Declaration & Power of Attorney

A ☐ [] signed ☐ [] unsigned Declaration.

A Power of Attorney.

A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27 ☐ [] is enclosed ☐ [] was filed in the prior application and small entity status is still proper and desired.

A certified copy of a _____ application.

Information Disclosure Statement under 37 CFR 1.97.

A petition to extend time to respond in the parent application.

Notification of change of ☐ [] power of attorney ☐ [] correspondence address filed in prior application.

- ☒ [X] Preliminary Amendment

**In view of the Unsigned Declaration as filed with this application and pursuant to 37 CFR §1.53(f),
Applicant requests deferral of the filing fee until submission of the Missing Parts of Application.**

DO NOT CHARGE THE FILING FEE AT THIS TIME



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

PETER GERBER et al.

Application No.: Not yet assigned

Filed: Herewith

For: INTERROGATION AND
RESPONDER SYSTEM

PRELIMINARY AMENDMENT

San Francisco, CA 94111
June 12, 2000

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination of the above-referenced application, please enter the following amendments and remarks.

IN THE SPECIFICATION:

Page 2, delete lines 11-12 and substitute therefor the following:

--In accordance with the invention, an interrogation device is used for identifying a target device. A transmitter is designed for transmitting a coded electromagnetic radiation. The target device has sensor means for detecting this radiation and for converting it into electrical signals, which are supplied to an evaluation unit, as well as transmitting means which, in accordance with decisions made by the evaluation unit, return messages to receiving means located inside or outside of the transmitter. The transmitter comprises a circuit with an oscillator and an antenna, which are designed to generate individual pulses, or short bursts in the giga-frequency range, which are chronologically modulated. A coded information signal is obtained from these pulses.—

Page 3, line 5, after "a" insert --receiver--, and delete "an" and substitute therefor --a receiver--.

line 8, after "unit", insert --terminal--.

Page 4, line 7, after "receiver" insert --circuit--.

line 8, change reference numerals "31, 32, 33" to --34, 35, 36--.

line 15, change "sensor" to --receiving--, and change reference numerals "11, 12" to --16, 17--.

IN THE CLAIMS:

Please amend the claims as follows:

1. (amended) An interrogation system [containing] comprising a transmitting device for the interrogation of a responder device, and receiving means, wherein the transmitting device is designed in such a way that modulated and/or coded electromagnetic radiation can be transmitted, [that the transmitting device is located inside or outside of the transmitting device] and wherein the responder device has sensor means for receiving this radiation and for converting it into electrical signals, an evaluation unit for processing the electrical signals, as well as transmitting means in order to return, in accordance with a decision made by the evaluation unit, a reply signal to the receiving means, [characterized in that] wherein the transmitting device contains a control circuit and an antenna which are designed in such a way that individual electromagnetic pulses, or short bursts of pulses, can be generated in the giga-frequency range, which are radiated by the antenna in a chronologically modulated and directional manner.

2. (amended) The interrogation system in accordance with claim 1, [characterized in that the] wherein a control circuit and [the] an antenna are placed into a transmitting device housing, which is designed for being mounted on a weapon.

3. (amended) The interrogation system in accordance with claim [1 or] 2, [characterized in that] wherein the antenna is integrated into a control circuit.

4. (amended) The interrogation system in accordance with [one of claims 1 to 3] claim 1, [characterized in that] wherein the frequency of the pulses transmitted by the transmitting device has a value, by means of which, using the antenna, a strongly directional radiating characteristic with an angle of the radiated lobe below 50 mrad[, preferably 30 mrad,] is achieved.

5. (amended) The interrogation system in accordance with [one of claims 1 to 4] claim 1, [characterized in that] wherein the modulation frequency of the transmitting device lies in the range between 10 and 1000 GHz, or 100 to 1000 GHz.

6. (amended) The interrogation system in accordance with [one of claims 1 to 5] claim 1, [characterized in that] wherein the sensor means of the responder device are designed to transmit response signals, which can be received by the transmitting device in order to also make possible a distance measurement between the transmitting device and the responder device in a central unit of the transmitting device.

7. (amended) The interrogation system in accordance with [one of claims 1 to 6] claim 1, [characterized in that at least] wherein the sensor means of the responder device are designed to be received in a portable harness system.

8. (amended) The interrogation system in accordance with [one of claims 1 to 7] claim 1, [characterized in that] wherein it can be integrated into a weapon[, preferably a portable firearm, or can be mounted on such].

9. (amended) A system [with] comprising

[-] an interrogation system containing a transmitting device for the interrogation of a responder device and receiving means, wherein the transmitting device is designed in such a way that modulated and/or coded electromagnetic radiation can be transmitted, and with

[-] a responder device, which has sensor means for receiving this radiation and for converting it into electrical signals, an evaluation unit for processing the electrical signals,

as well as transmitting means in order to return, in accordance with a decision made by the evaluation unit, a reply signal to the interrogation system receiving means,

[characterized in that] wherein the transmitting device contains a control circuit and an antenna which are designed in such a way that individual electromagnetic pulses, or short bursts of pulses, can be generated in the giga-frequency range, which are radiated by the antenna chronologically modulated and directionally.

IN THE ABSTRACT:

Following the Abstract of disclosure, delete "(Fig. 3)".

REMARKS

Amendment is made to revise the language of the specification, abstract and claims to conform it to U.S. standards, and to eliminate multiple claim dependencies, thereby avoiding the need to pay the multiple dependent surcharge.

Respectfully submitted,



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Case 00-OC091/US

INTERROGATION AND RESPONDERSYSTEM

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Priority:

Switzerland, No. 2000 0943/00

Filing Date:

May 12, 2000

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Case 00-OC091/US

U S A

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INTERROGATION AND RESPONDER SYSTEM

FIELD OF THE INVENTION

The invention relates to an interrogation and responder system.

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BACKGROUND OF THE INVENTION

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A laser identification/simulation system with a laser device for identifying a responder device is known from European Patent Application **97 120818.6** (Publication No. EP 0 859 243 A1). The laser device is designed for transmitting a coded laser beam, wherein the responder device has sensor means for detecting the laser beam and for converting it into electrical signals, which are passed on to an evaluation unit, as well as transmitting means for returning messages in accordance with decisions made in the evaluation unit to receiving means located inside or outside of the interrogation system. This interrogation system is designed to send a tight directional laser beam and contains chopping means for sending out a laser beam which is not only coded, but also chopped with a predetermined frequency. The sensor means of the responder device include means for obtaining an electrical signal from the received chopped laser beam, which is supplied to a pre- amplifier, which is connected upstream of the discriminator.

Such a system is mounted in weapons which are normally used by soldiers, wherein all participants in an exercise, both persons and objects, can be equipped with detectors, which register a possible weapons effect on the participant. The functioning of such known systems represents the basis of a friend-foe identification system (IFF), which can also be used in accordance with the present invention.

OBJECT AND SUMMARY OF THE INVENTION

It is now the object of the present invention to create a further system of this type, which avoids or reduces the disadvantages of known systems.

In accordance with the invention, this object is advantageously attained by means of a system in accordance with claim 1.

Further advantageous embodiments of the invention ensue from the further dependent claims.

The invention will be explained in greater detail in what follows by means of different drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a schematic representation of a transmitting device (interrogation system) in accordance with the invention,

Fig. 2 shows a schematic representation of a receiving device (responder device) in accordance with the invention,

Fig. 3 represents a diagram for explaining the information signals used.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The interrogation system **10** in accordance with Fig. 1 comprises a circuit **11**, which can be mounted on a weapon and which has an antenna **12**, which can be integrated into the circuit **11**, and a modulator **13**, to which at least one terminal **14**, as well as a central unit **15** can be connected. The terminal **14** is, for example, provided with a keyboard and/or a display and/or a microphone and/or a headset, etc. The circuit **11**, which is designed as an active transmitter, can generate single pulses or short bursts of pulses (for example by means of an oscillator), which are very short but nevertheless have relatively large energy. Receiving means **16**, **17** are connected to the central unit **15** of the interrogation system **10**, which are located inside or outside of the actual interrogation system **10**. The receiving

means **16, 17**, which can also be connected to one of the mentioned terminals **14** and/or also to other terminals, comprise a receiver device **16** and an antenna or a sensor **17**, for example. In place of the structure represented in Fig. 1, the interrogation system **10** can have a communications bus, for example.

5 The responder system **20** in accordance with Fig. 2 comprises a circuit **21** with an antenna **22**, which can be integrated into the circuit **21**. The responder system **20** can contain a demodulator or evaluation unit **23**, for example, for evaluating the received electromagnetic waves, to which at least one terminal **24** and a central unit **25** are connected.

10 The terminal **24** can be provided, for example, with a display and/or a headset and/or a microphone. The circuit **21**, which is designed as a receiver, can for example comprise a detector and, if required, an amplifier, which process pulses or bursts of pulses received by the antenna **22**. Transmitting means **26, 27** are connected to the central unit **25** for returning messages in accordance with decisions made in the evaluation unit to receiving means **16, 17** (Fig. 1) of the interrogation system. The transmitting means **26, 27**, which can also be
15 located inside or outside of the actual responder system **20**, for example comprise a transmitting device **26** and a transmitting antenna **27**.

The system in accordance with the invention now functions as follows:

20 The persons and objects (tanks, etc.) participating in an exercise can carry at least one receiver **21, 22**, preferably with the aid of a harness system in accordance with European Patent Applications EP 0 859 243 A1 and/or EP 0 836 068 A1 and/or EP 0 836 069 A1. Incidentally, the subject of the present invention can comprise all means mentioned in the above patent applications for carrying out all functions known from these patent applications in the same or similar manner.

25 Three pulses **31, 32, 33** on the order of picoseconds are represented in Fig. 3 by way of example. This corresponds to an oscillation frequency of 10 to 1000 GHz and a wave length of 30 to 0.3 mm. Since, because of this, the required antenna **12** need only have relatively small dimensions, it can be designed in such a way that it can be mounted on the weapon. Moreover, if desired, the antenna **12**, together with an oscillator, can be integrated in the circuit **11**. Signals delivered from a terminal **14** cause a modulation and/or a coding in the
30 modulator **13** of the control signals for the oscillator in such a way, that the pulses **31, 32, 33** are triggered at different intervals. Thus, these pulses contain the information to be transmitted. With an appropriate shaping of the antenna **12** it is possible to transmit the pulses **31, 32, 33** in a directed, or respectively directional manner. The manner of transmission employed here is also known as ultra-wide spread spectrum transmission. It
35 has been found that this type of transmission has various properties, which make the advantageous realization of the systems in accordance with the invention possible. Such systems can be constructed to be small and energy- saving. With this type of communications it is also possible to determine the distance to the target (responder device).

A further important advantage is that the communications principle employed here is difficult to detect for third parties.

The radiation characteristics of the interrogation system **10** can be directed as desired by means of a suitable antenna **12**. With an appropriate antenna **12** it is possible to achieve an angle of the radiated lobe of up to 30 mrad. The layout and the dimensioning of antennas is sufficiently known to one skilled in the art.

The pulses **31, 32, 33** received via the antenna **22** in the receiver **21** are detected and preferably also amplified. It is then possible to generate from the detected pulses **31, 32, 33** information pulses **37, 38, 39** (for example in rectangular form), which can easily be much longer than the pulses **31, 32, 33**, and can also be chronologically displaced. Information provided in coded form by means of the different spacing d_1, d_2 between the individual pulses **37, 38, 39** is deciphered in the demodulator **23** and is provided in a suitable electrical form to at least one of the terminals **24, 25**. The responder system **20** can be designed, for example, for radiating response signals and/or echo signals via the transmitting means **26, 27**, which can be received by the sensor means **11, 12** of the interrogation system **10**. A distance measurement between the interrogation system **10** and the responder system **20** is made possible by this. This means that the marksman performing the interrogation can even measure the distance to his target (the responder system **20**). This has the advantage that, in case two objects located behind each other are illuminated, the soldier has the additional possibility of estimating which signal is more realistic.

In place of individual pulses **31, 32, 33** it is also possible to transmit bursts of pulses which, if necessary, are damped and/or harmonic and/or inharmonic, for the purpose of interrogation.

WHAT IS CLAIMED IS:

1. An interrogation system containing a transmitting device for the interrogation of a
5 responder device, and receiving means, wherein the transmitting device is designed in such
a way that modulated and/or coded electromagnetic radiation can be transmitted, that the
transmitting device is located inside or outside of the responder device, and wherein the
responder device has sensor means for receiving this radiation and for converting it into
electrical signals, an evaluation unit for processing the electrical signals, as well as
10 transmitting means in order to return, in accordance with a decision made by the evaluation
unit, a reply signal to the receiving means, characterized in that the transmitting device
contains a control circuit and an antenna which are designed in such a way that individual
electromagnetic pulses, or short bursts of pulses, can be generated in the giga-frequency
range, which are radiated by the antenna in a chronologically modulated and directional
15 manner.

2. The interrogation system in accordance with claim 1, characterized in that the control
circuit and the antenna are placed into a housing, which is designed for being mounted on a
weapon.

3. The interrogation system in accordance with claim 1 or 2, characterized in that the
antenna is integrated into the control circuit.

4. The interrogation system in accordance with one of claims 1 to 3, characterized in that the
25 frequency of the pulses transmitted by the transmitting device has a value, by means of
which, using the antenna, a strongly directional radiating characteristic with an angle of the
radiated lobe below 50 mrad, preferably 30 mrad, is achieved.

5. The interrogation system in accordance with one of claims 1 to 4, characterized in
30 that the modulation frequency of the transmitting device lies in the range between 10 and
1000 GHz, or 100 to 1000 GHz.

6. The interrogation system in accordance with one of claims 1 to 5, characterized in
that the sensor means of the responder device are designed to transmit response signals,
35 which can be received by the transmitting device in order to also make possible a distance
measurement between the transmitting device and the responder device in a central unit of
the transmitting device.

7. The interrogation system in accordance with one of claims 1 to 6, characterized in that at least the sensor means of the responder device are designed to be received in a portable harness system.

5 8. The interrogation system in accordance with one of claims 1 to 7, characterized in that it can be integrated into a weapon, preferably a portable firearm, or can be mounted on such.

9. A system with

10 - an interrogation system containing a transmitting device for the interrogation of a responder device and receiving means, wherein the transmitting device is designed in such a way that modulated and/or coded electromagnetic radiation can be transmitted, and with

15 - a responder device, which has sensor means for receiving this radiation and for converting it into electrical signals, an evaluation unit for processing the electrical signals, as well as transmitting means in order to return, in accordance with a decision made by the evaluation unit, a reply signal to the receiving means,

20 characterized in that the transmitting device contains a control circuit and an antenna which are designed in such a way that individual electromagnetic pulses, or short bursts of pulses, can be generated in the giga-frequency range, which are radiated by the antenna chronologically modulated and directionally.

ABSTRACT OF THE DISCLOSURE

The interrogation device is used for identifying a target device. A transmitter is designed
5 for transmitting a coded electromagnetic radiation. The target device has sensor means for
detecting this radiation and for converting it into electrical signals, which are supplied to an
evaluation unit, as well as transmitting means which, in accordance with decisions made by
the evaluation unit, return messages to receiving means located inside or outside of the
transmitter. The transmitter comprises a circuit with an oscillator and an antenna, which are
10 designed to generate individual pulses, or short bursts of pulses in the giga-frequency range,
which are chronologically modulated. A coded information signal is obtained from these
pulses.

(Fig. 3)

1/1

Fig. 1

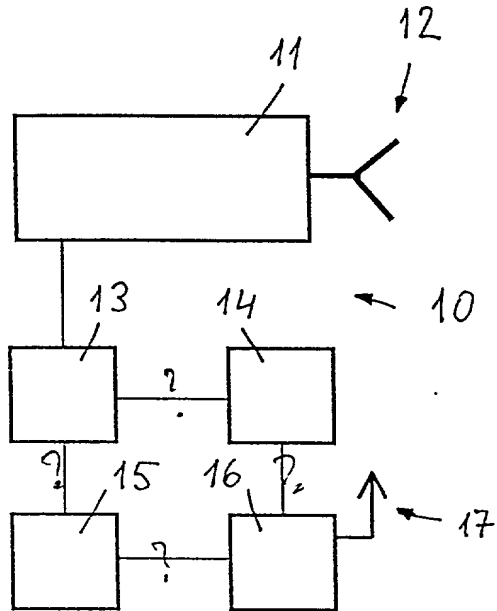


Fig. 2

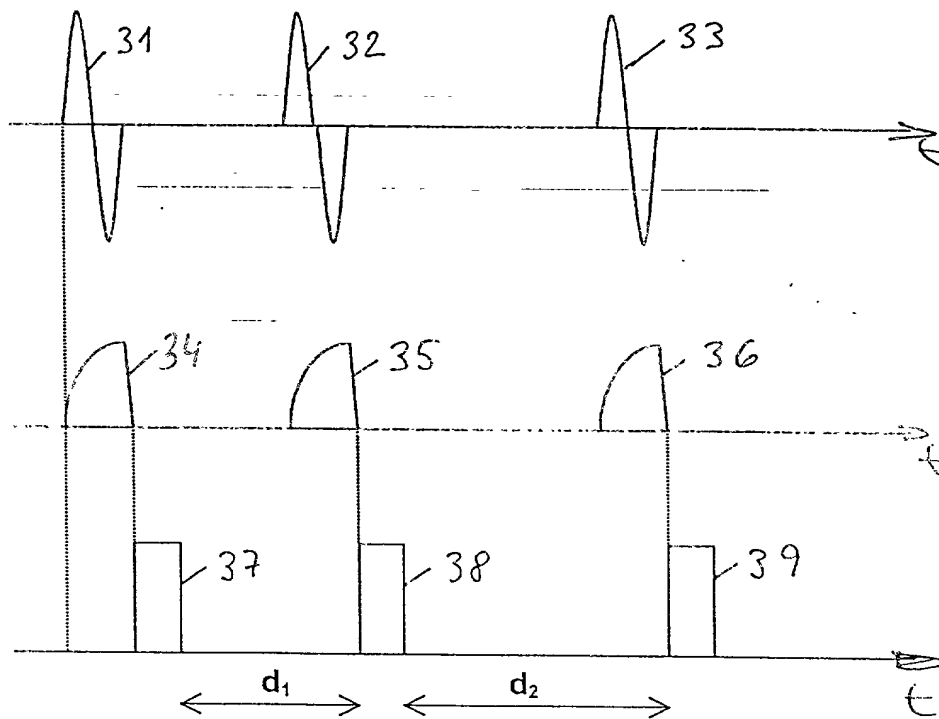
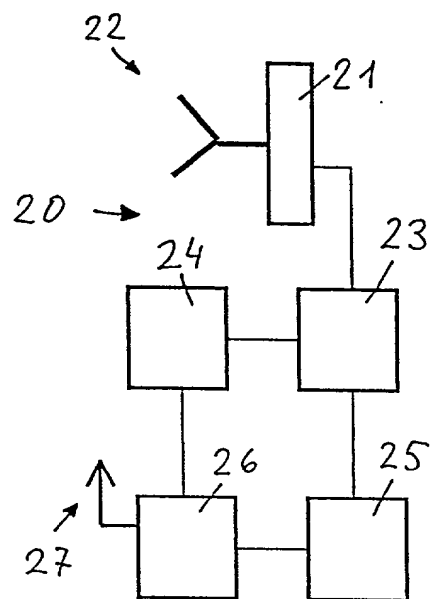


Fig. 3

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I declare that:

My residence, post office address and citizenship are as stated below next to my name; I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: **INTERROGATION AND RESPONDER SYSTEM** the specification of which X is attached hereto or was filed on as Application No. and was amended on (if applicable).

I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56. I claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Country	Application No.	Date of Filing	Priority Claimed Under 35 USC 119
Switzerland	2000 0943/00	May 12, 2000	yes

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below:

Application No.	Filing Date

I claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Application No.	Date of Filing	Status



POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Guy W. Chambers, Reg. No. 30,617
J. Georg Seka, Reg. No. 24,491
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I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signature of Inventor 1	Signature of Inventor 2
 _____	 _____
Peter Gerber	Fabian Ochsner
Date	Date

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